Research on Data Center System Design of Server Virtual Machine Based on Cloud Computing

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***Abstract*—The so-called informationization of education is to introduce advanced modern information technology in the traditional education, teaching and management. Compared with ordinary undergraduate colleges, colleges and universities start late and their information construction is also in a backward stage. Since the end of the last century, the Ministry of Education has proposed that China's higher education has developed rapidly in order to "develop vigorously in higher vocational education." The control system is rather lengthy and the system scale is large, resulting in a larger data. The training room will be set up in the colleges and universities to be responsible for the management and maintenance of data. The main functions include: maintaining the safe operation of the server, effectively ensuring data security, being able to respond to and respond to accidents in a timely and effective manner and flexibly managing and distributing effectively. Resources, etc. This paper aims to introduce mainstream cloud computing technology into the information management system of the training room to form a data center system with more efficient operation, more flexible data processing and lower cost.**

Keywords: ***Cloud computing; training room; server***

I. THE MAIN CHALLENGE FACING THE CONSTRUCTION OF PC-BASED TRAINING ROOM ENVIRONMENT

A.THE HARDWARE AND SOFTWARE ENVIRONMENT IS COMPLEX AND DIFFICULT TO MANAGE

The training rooms of colleges and universities often undertake multiple professional teaching tasks. The training environment teaches, which means that there are more and more computer training rooms and the number of PCs that need to be managed is increasing. In addition, due to the activity of student users, the pre-installation of training room PCs is often modified. More vulnerable to attacks and violations of online viruses[1].

B. INFORMATION ENVIRONMENT IS BACKWARD

The current informatization has entered the mobile era. The information system has moved from C/S architecture to B/S architecture. People can enjoy informatized services and handle related services in any way, anytime, in a variety of ways. The construction of the traditional training room limits students to the environment of a single PC, which is difficult to cope with the current information society. In addition, due to restrictions on the restricted management system and shortage of maintenance personnel, the opening hours of the training room and the training platform were limited, which caused the waste of training resources to a certain extent.

C. HIGH COST OF USE, WHICH HAS A CERTAIN IMPACT ON THE TEACHING ENVIRONMENT

The life cycle of traditional PCs is usually only 3-5 years. The annual depreciation cost of fixed assets and the cost of supporting management and maintenance are huge. Moreover, in the case of hardware replacement, software replacement and operating system upgrade, it is often necessary for the entire PC. The hardware environment is upgraded, which brings huge cost waste. The traditional PC has high energy consumption and has some noise. In an environment where multiple PCs are running at the same time, noise will have a certain impact on the teaching environment and teaching quality[2].

II. CONSTRUCTION OF TRAINING ROOM BASED ON CLOUD COMPUTING MODE

In view of the problems existing in the construction of traditional training rooms, I have long-term research and conceived a set of training room construction solutions based on advanced desktop virtualization technology in cloud computing; using this solution can help the training room well. The builder solves the above problem. The program is now briefly described as follows. The specific scheme and function are shown in Figure 1.

Figure 1: Specific scheme and function

A. CENTRALIZED MANAGEMENT AFTER VIRTUALIZING THE DESKTOP ENVIRONMENT FOR HARDWARE INDEPENDENCE

With desktop virtualization technology, all of the user's

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desktop operating environments can be centralized on the background server. Users only need to access their desktop operating environment through the network. Thanks to the centralized management of the software environment and data storage, various software environments can be rapidly upgraded and the chances of users being infected with viruses are greatly reduced. In this mode, a single manager can easily manage more than 1000 desktop environments and fast switching between different lecture environments takes only tens of seconds. In this way, a single training room can serve more departments.

B. PROVIDE 7×24 HOURS INFORMATION TRAINING ENVIRONMENT FOR TEACHERS AND STUDENTS

The back end of the desktop cloud can use server virtualization technology to build a 7×24 hour desktop cloud environment that does not drop. In the desktop cloud technology environment, only the connectivity of the network (wired network or wireless network) is required and students can access the training anytime and anywhere through different types of terminals (notebooks, tablets, thin clients, handheld terminals, etc.).

C. REDUCE CLIENT HARDWARE REQUIREMENTS, GREEN ENERGY SAVING

In the solution, customers are advised to use a thin client or tablet as the user's terminal. Due to its low power consumption and quiet design, the operation interface is closer to the current mainstream information operation mode, so the entire training environment and student experience will be better. The thin client recommended in the solution is usually industrial grade design with high reliability and stability[3].

III. SERVER VIRTUALIZATION TECHNOLOGY ANALYSIS

A. CPU VIRTUALIZATION

In the X86 architecture, the CPU has four running levels of Ring0, Ring1, Ring2 and Ring3, of which the Ring0 level is the highest. In general, Ring0 is responsible for running the operating system and Ring3 is responsible for running the application and cannot execute privileged instructions. Based on this, when the CPU is virtualized, the virtualization layer needs to be added to the client operation layer to ensure that the guest operating system privileged instructions can be executed at the Ring0 level[4].

B. MEMORY VIRTUALIZATION

The memory virtualization design is used to realize unified management of all physical data in the server and can form mutual isolation and continuous virtual memory space among multiple virtual servers. Among them, a management unit needs to be established for the virtualized memory, which is mainly responsible for maintaining the mapping relationship between the physical server memory and the contiguous memory blocks seen by the virtual machine, such as the common shadow page table method and the page table writing method[5].

C. EQUIPMENT AND IO VIRTUALIZATION

Device and I/O are also important components of the server. When virtualizing the server, virtualizing the device and I/O can realize unified management of the physical machine and satisfy the virtual machine by packaging multiple virtual devices. Run and use and be able to respond to each virtual machine device access and I/O request in a timely manner. Nowadays, the virtualization research in this aspect is generally based on software. Configure 8 8Gb Fibre Channel interfaces, configure two NAS controllers, use Intel quad-core processor, main frequency ≥2.1GHz; configure ≥24GB memory, use NAS dedicated operating system (non-windows storage system), each controller configuration 2 10Gb ports. Operating system support: Windows, Linux, AIX, Solaris, HP-UX, VMware ESX, etc. Disk interface ≥ 4 6Gb four-channel SAS disk interfaces, the maximum number of expandable disks is not less than 250, supports RAID 0, 1, 1/0, 3, 5, 6 and other RAID types; configure 600G, 15000 rpm SAS There are 18 hard disks, 45 2TB NL-SAS disks, 5 100G enterprise-class flash disks and a total storage capacity of 100T[6].

IV. SERVER VIRTUAL DATA CENTER EFFECT

On the surface, the entire campus network structure has not changed much. The difference is that the number of servers and access devices in the data center is greatly reduced and data sharing and link robustness are improved. The cluster consists of physical hosts and multiple virtual servers are running on the cluster for unified management. The operation of other servers that do not participate in the transformation is not affected. As the size of the data grows, the storage and virtualization of the host device can be dynamically increased, providing more computing and storage resources while improving the fault tolerance of the entire architecture. The relevant running performance of the server is shown in Figure 2, where k represents the number of concurrent[7].

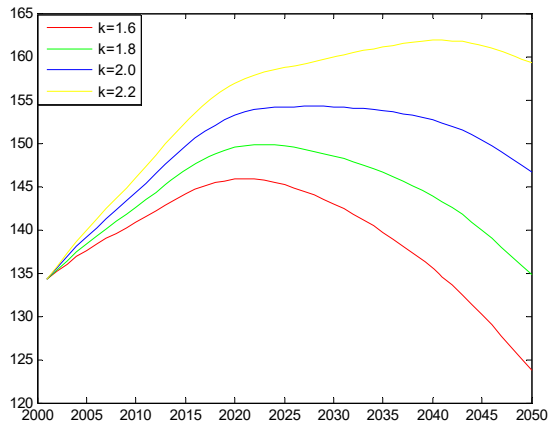

Figure 2: Relevant running performance of the server

On the network side, there is no big difference between the management of virtual servers and the management of physical servers, but it is much simpler. At present, the cloud computing data center system of the training room has been upgraded and upgraded in the college, re-established hardware equipment. Compared with the transformation, it has achieved great results. In terms of energy consumption, the number of

22 servers that were originally operated has been reduced to seven[8].

V. CONCLUSION

The cloud computing data center brings many advantages, can achieve a consolidation ratio of 15:1 or more and dynamically allocate resources for key business applications through management automation to improve efficiency. By balancing CPU processing power with cost-effective memory configurations and increasing virtual machine density, the economic benefits of server virtualization can be made easier. Finally, when the network access layer is unified and the virtual machine link and the physical server link are treated in the same way, the virtual environment can be managed more efficiently and safely and the service quality is better.

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